IN THE CLAIMS

Claim 1 (currently amended): A process for analyzing a medical condition of a user comprising the following steps:

a) reading at least one signal from ~~a~~ said user;

b) transforming said at least one signal into at least one digital signal;

c) extracting a plurality of parameters from said at least one digital signal;

d) analyzing said plurality of parameters and comparing said plurality of parameters to a range in a set of a plurality of preset parameters;

e) determining whether ~~a~~ said user has an abnormal medical condition by determining whether said plurality of parameters fall outside of said range in said plurality of preset parameters;

wherein said step of determining whether said user has an abnormal medical condition further includes a step of setting said range in said plurality of preset parameters based upon a medical history of said user, an average formed from a plurality of previous users and a normal range of said plurality of parameters; and

f) determining whether to trigger an alarm warning ~~the~~ said user of his or her medical condition when said at least one of said plurality of parameters ~~fall~~ falls outside of said ~~preset~~ ranges for said plurality of preset parameters.

Claim 2 (currently amended): The process as in claim 1, further comprising the step of selecting a particular alarm from a set of a plurality of alarms for the user based upon which of said plurality of parameters fall outside of said range of said plurality of ~~said~~ preset parameters.

Claim 3 (currently amended): The process as in claim 1, wherein said step of extracting a plurality of parameters includes extracting a plurality of data points from said at least one digital signal and forming at least one QRS ~~wave~~ complex from said plurality of data points.

Claims 4-18 (canceled)

Claim 19 (original): The process as in claim 1, further comprising the step of determining whether to send a signal to the user to administer a form of external stimuli.

Claims 20 (canceled)

Claim 21 (currently amended): A process for analyzing a medical condition of a user by using a portable information device having a plurality of sensors, at least one ~~digital to analog~~ analog to digital converter and at least one transceiver and by using an information processing device having at least one medical information analyzer, at least one data store, at least one parameter analyzer, at least one abnormality identifier and at least one alarm controller wherein the process comprises the following steps:

a) reading at least one signal from the plurality of-sensors attached to the user;

b) transferring said at least one signal from said plurality of sensors into at least one digital signal using the ~~digital to analog~~ analog to digital converter;

c) extracting a plurality of parameters from said at least one digital signal using the medical information analyzer;

d) analyzing said plurality of parameters and comparing said plurality of parameters to a range in a set of a plurality of preset parameters stored in the data store, by using the parameter analyzer;

e) determining whether ~~a~~ the user has an abnormal medical condition by determining whether at least one of said plurality of parameters ~~fall~~ falls outside of said range in said set of said plurality of preset parameters by using the abnormality identifier; and

f) determining whether to trigger an alarm warning the user of his or her medical condition when said at least one of said plurality of parameters ~~fall~~ falls outside of said ~~preset ranges~~ range for said set of said plurality of said preset parameters by using the abnormality identifier in conjunction with the alarm controller.

Claim 22 (currently amended) The process as in claim 21, further comprising the step of using the alarm controller to select a particular alarm from a set of a plurality of

alarms, stored in the at least one data store, for the user based upon which of said plurality of parameters fall outside of said range of said set of said plurality of ~~said~~ preset parameters.

Claim 23 (canceled)

Claim 24 (original): The process as in claim 21, further comprising the step of determining whether to send a signal to the user to administer a form of external stimuli.

Claim 25 (canceled)

Claim 26 (currently amended) A process for analyzing a medical condition of a user comprising the following steps:

reading at least one signal from a user;

transferring said at least one signal into at least one digital signal;

extracting a plurality of parameters from said at least one digital signal, wherein said plurality of parameters are selected from a group consisting of: pulse rate, intermediate alteration of a pulse rate, R-R interval, premature beats, group of consecutive premature beats, [[an]] atrial/ventricular ~~fibrillation flutter~~ fibrillation/flutter, ST-segment depression/elevation, T-wave inversion, width of Q-wave, Ratio of Amplitude of Q-wave to amplitude of R-wave, amplitude of R-wave, width of QT-interval, width of QRS complex, width of PQ-interval, Standard deviation of the average normal-to-normal R-R intervals;

analyzing said plurality of parameters and comparing said plurality of parameters to a range in a set of a plurality of preset parameters;

determining whether ~~a~~ said user has an abnormal medical condition by determining whether said plurality of parameters fall outside of said range in said set of said plurality of preset parameters; and

determining whether to trigger an alarm warning the user of his or her medical condition when said at least one of said plurality of parameters ~~fall~~ falls outside of said ~~preset~~ ranges for said set of said plurality of preset parameters.

Claim 27 (original) The process as in claim 26, wherein said step of determining whether a user has an abnormal condition includes determining at least one abnormal condition selected from the group consisting of: sick sinus node syndrome, slow ventricular rhythm, AV block II-III degree, paroxysm, tachycardia, sudden heart block, sinus arrest, cardiac arrest, extrasystoles, group extrasystoles, paroxysm of atrial/ventricular ~~fibrillation flutter~~ fibrillation/flutter, myocardial ischemia, myocardial infarction, bundle branch blocks, ventricular tachyarrhythmia.

Claim 28 (currently amended): A process for analyzing a medical condition of a user comprising the following steps:

reading at least one signal from the ~~a~~ user;

transferring said at least one signal into at least one digital signal;

extracting a plurality of parameters from said at least one digital signal;

analyzing said plurality of parameters and comparing said plurality of parameters to a range in a set of a plurality of preset parameters;

predicting a possibility of a future occurrence of an abnormal medical condition in the user using at least one of said plurality of parameters;

determining whether a user has an abnormal medical condition by determining whether said plurality of parameters fall outside of said range in said set of said plurality of parameters and determining whether to trigger an alarm warning the user of his or her medical condition or possible future medical condition when said at least one of said plurality of parameters ~~fall~~ falls outside of said ~~preset~~ ranges for said set of said plurality of preset parameters.

Claims 29 (original): The process as in claim 28, wherein said abnormal medical condition is a development of myocardial infarction or sudden cardiac death.

Claim 30 (currently amended) The process as in claim 28, wherein said step of predicting a possibility of a future occurrence of an abnormal medical condition includes using at least one of the following parameters: heart beats per minute of the user; ST init. which is the ST segment level before observation of said user begins ~~beginning~~, ST meas. which is the ST segment level at the current ~~movement~~ moment, ST thresh. which is the ST segment threshold at normal levels, QT meas. which is the QT interval duration at the current moment; QT norm. which is the QT interval normal duration.

Claims 31-33 (canceled)

Claim 34 (currently amended): The process as in claim 28, further comprising the step of setting a range for said at least one preset parameter to predict said future occurrence of said abnormal medical condition.

Claim 35 (original): The process as in claim 28, further comprising the steps of inputting the user's medical history into a database and storing said user's medical history.

Claim 36 (currently amended): The process as in claim 34, further comprising the step of adjusting said range for said at least one preset parameter using at least one level of adaptability.

Claim 37 (currently amended): The process as in claim 34, further comprising the step of adjusting said range for said at least one preset parameter using a first level, a second level and a third level of adaptability.

Claim 38 (original): The process as in claim 35, wherein said first level of adaptability includes adjusting said range based upon at least one of the following user's characteristics: age, gender, weight, or medical history.

Claim 39 (original): The process as in claim 37, wherein said second level includes adjusting said range based upon a log file of cardiac events wherein said adjustment is actuated by a person controlling the setting of the range.

Claim 40 (original): The process as in claim 37, wherein said third level includes automatically adjusting said range.

Claim 41 (currently amended) An article of manufacture comprising:

a) a computer usable medium having a machine-readable program code means for reading at least one signal from a user;

b) a machine-readable program code means for transferring said at least one signal into at least one digital signal;

c) a machine-readable program code means for extracting a plurality of parameters from said at least one digital signal;

d) a machine-readable program code means for analyzing said plurality of parameters and comparing said plurality of parameters to a range in a set of a plurality of preset parameters;

e) a machine-readable program code means for predicting a possibility of a future occurrence of an abnormal medical condition in the user using at least one of said plurality of parameters;

f) a machine readable program code means for determining whether a user has an abnormal medical condition by determining whether said plurality of parameters fall outside of said range in said set of said plurality of preset parameters; and

g) a machine readable program code means for determining whether to trigger an alarm warning the user of his or her medical condition or a possible future medical condition when said at least one of said plurality of parameters ~~fall~~ falls outside of said ~~preset~~ ranges for said set of said plurality of preset parameters.

Claims 42-52 (canceled)

Claim 53 (New) A process for extracting and analyzing cardiac parameters of a user comprising the following steps:

a) reading at least one signal of electrical activity of the heart from the user;

b) transforming said at least one signal into at least one digital signal;

c) extracting a plurality of cardiac parameters from said at least one digital signal; and

d) predicting a possibility of a future occurrence of significant cardiac events in the user using at least one of said plurality of cardiac parameters.

Claim 54 (New) The process as in claim 53, wherein said step of extracting the plurality of cardiac parameters comprises the following steps:

determining characteristic points where said digital signal reaches maximums, minimums or changes direction;

analyzing noise level in said digital signal;

determining the plurality of pulsometric parameters;

determining the plurality of QRS-complex parameters; and

averaging the plurality of pulsometric and QRS-complex parameters for a number of significant R-R intervals.

Claim 55 (New) The process as in claim 54, wherein said step of determining characteristic points includes:

extracting at least two pairs of consecutive significant dominant characteristic points of maximum signal wherein said first pair is R_{i-1}, R_i and said second pair is R_i, R_{i+1};

determining at least two significant R-R intervals wherein said first R-R interval is $R_{i-1}R_i$, and said second R-R interval is R_iR_{i+1};

determining at least one QRS-fragment comprised of two consecutive significant R-R intervals;

determining at least one QRS-complex;

extracting dominant characteristic points P, Q, J, S, and T in ~~QRS-complex~~ QRS-fragment; and

extracting auxiliary characteristic points I, K, P1, P2, T1, and T2 in QRS-fragment.

Claim 56 (New) The process as in claim 54, wherein said step of analyzing noise level includes:

calculating the noise level N for current R-R interval;

comparing the noise level with a threshold value; and

excluding current R-R interval if noise level exceeds threshold value.

Claim 57 (New) The process as in claim 56, wherein said step of calculation of the noise level N for current R-R interval includes using the following formula:

believing N=0, then:

for each given point j from interval $[R_{i-2}+e_1, R_i-e_1]$:

if $|(V_j-V_{j-1})>2^m$ and $|(V_j-V_{j+1})>2^m$,

then $N=N+2^m$, $m=5, \ldots, j \in [R_{i-2}+ e_1, R_i- e_1]$

for each given point j from interval $[R_{i-2}+e_2, R_i-e_2]$:

if $(V_j-V_{j-1})>2^m$ and $(V_j-V_{j+1})>2^m$,

then $N=N+2^m$, $m=5 \ldots, 2\, j \in [R_{i-2}+ e_2, R_i- e_2]$

wherein:

e_1, e_2—indentations from threshold points (threshold point are empiric values equal 75 ms and 115 ms respectively);

V_j—amplitude in point j;

N—noise level value.

Claim 58 (New) The process as in claim 54, wherein said step of determining the plurality of pulsometric parameters includes determining:

a heart rate;
a heart rate maximum;
a heart rate minimum;
a heart rate variability;
a number of single premature beats;
a number of groups of consecutive premature beats; and
an atrial/ventricular fibrillation/flutter.

Claim 59 (New) The process as in claim 54, wherein said step of determining a plurality of QRS-complex parameters includes calculation of:

a ST-segment depression/elevation;
a width of a Q-wave (WQ);
an amplitude of the Q-wave;
a width of QRS-complex;
a width of PQ interval;
a width of QT interval;
an amplitude of R wave;
T wave inversion;
Ratio of amplitude of Q wave to amplitude of R wave; and
Standard Deviation of the average Normal-to-Normal R-R interval.

Claim 60 (New) The process as in claim 55, wherein said step of extracting R point from said digital signal includes using the following formula:

the point R has been identified if:

$(V - V1) > A1$

$(V - V2) > A2$

wherein V is the amplitude at a current point along the QRS fragment;
V1 is the amplitude at (t-d1)

V2 is the amplitude at point (t-d2)

wherein t is the current time and d1, d2, A1, and A2 are empiric constants.

Claim 61 (New) The process as in claim 55, wherein said step of extracting dominant characteristic point Q includes using the following formula:

the point Q has been identified if:

$(d1/d2) \geq Q_r$ and $(A_r - A_i) > A_{rQ}$

wherein $d1 = A_i - A_{i-3}$, $d2 = A_{i+3} - A_i$, and Q_r, A_{rQ}, and D_Q are empiric constants.

Claim 62 (New) The process as in claim 55, wherein said step of extracting dominant characteristic point S includes using the following formula:

the point S has been identified if:

$A_{i+1} > A_1$ and $(A_R - A_i) > A_{RS}$ wherein $i = R, \ldots, R+D_S$

or

$(A_i - A_{i-3}) < A_d$ and $(A_R - A_i) > A_{RQ}$, $i = R, \ldots, R-D_S$

or

$(d1/d2) \geq Sr$ and $(A_r - A_i) > A_{RS}$

wherein A_i is the amplitude, $d1 = A_i - A_{i-3}$, $d2 = A_{i+3} - A_i$, A_{RS}, A_d, D_S S_r, and A_{RQ} are empiric constants.

Claim 63 (New) The process as in claim 55, wherein said step of extracting dominant characteristic point J includes using the following formula:

the point J has been identified if:

$(A_{i-3} - A_i) < A_d$ $i = S, \ldots, S+D_j$,

wherein A_i - amplitude, A_d and D_j are empiric constants.

Claim 64 (New) The process as in claim 55, wherein said step of extracting dominant characteristic point T includes using the following formula:

the point T has been identified if the distance from point (i, A_i) to line (I, I_N)>T_{Amin},

wherein (i, A_i) = maximum point and $T_{Amin}=A_N$ for normal T-wave and $T_{Amin}=A_{IN}$ for inverse T-wave;

for flat T-wave

$(A_i-A_{i+5}) > A_d$, i=J, . . . , N2,

wherein A_i = amplitude and A_N, A_{IN}, and A_d are empiric constants.

Claim 65 (New) The process as in claim 55, wherein said step of extracting dominant characteristic point P includes using the following formula:

the point P has been identified if:

$A_i-A_{i-5}>A_d$ and $A_i-A_{i+5}>A_d$;

wherein A_d is an empiric constant.

Claim 66 (New) The process as in claim 55, wherein said step of extracting auxiliary characteristic point I includes using the following formula:

the point I has been identified if

$(A_{i-3}-A_i) < A_d$ and I = Q, . . . , Q-D_r

wherein A_i = amplitude and A_d and D_I are empiric constants; and

wherein the point I is considered equal to point Q if $(A_{i-3}-A_i) \geq A_d$.

Claim 67 (New) The process as in claim 55, wherein said step of extracting auxiliary characteristic point K includes using the following formula:

the point K has been identified as (J+D_j, A_{j+Dj})

wherein A_{j+Dj} is amplitude in point J + D_j and D_j is ~~an empiric~~ a preset constant.

Claim 68 (New) The process as in claim 55, wherein said step of extracting auxiliary characteristic points T1, T2, and P2 includes using the following formula:

the point is identified if the angle formed by the local isoline and the line between A_i and the point becomes less than the previous angle contained by the local isoline and the line between A_{i-1} and the point, and this tendency continues within a 40 ms time period.

Claim 69 (New) The process as in claim 55, wherein said step of extracting auxiliary characteristic point P1 includes using the following formula:

P1=P-(P2-P).

Claim 70 (New) The process as in claim 58, wherein said step of determining said atrial fibrillation flutter F includes using the following formulae:

F=(F1+F2)/X% wherein F1 is ~~an extrasystole~~ a premature beat component, F2 is a variability component and X is an empiric constant;

F1=(E/G)*100 wherein E is the number of ~~extrasystoles~~ premature beats within G number of previous R-R intervals;

wherein if F1>50%, then F1 is considered equal 50%;

$FRR=(RR_{max} - RR_{min})/RR_{max}*100$;

wherein if m1>2 then F2 =S2/m1 wherein,

S1 is the sum of all of the variability of the G intervals; or

wherein if m2>2 then S2 is the sum of all of the variability of all G intervals;

wherein if $m1 \leq 2$ AND $m2 \leq$ then F2=0; and

wherein M1 is the number of R-R intervals with variability $10\%<F_{RR}<30\%$ and m2 is the number of R-R intervals with variability $F_{RR}<10\%$.

Claim 71 (New) The process as in claim 53, wherein said step of predicting a possibility of a future occurrence of significant cardiac events in the user using at least one of said plurality of cardiac parameters includes using the following formula:

$$RR = 1 + \sqrt{K_1 * \left|\frac{STmeas - STinit}{STinit. + STthresh.}\right|^2 + \left|\frac{QTmeas.}{QTnorm.} - 1\right|^2 + \left|\frac{N_1 + K_2 * N_2 + K_3 * N_3}{HR}\right|^2}$$

wherein:

RR is the complex Relative Risk of sudden cardiac death and development of myocardial infarction;

HR is the heart rate;

ST init. = the initial value of ST-segment depression/elevation;

ST meas. = measured value ST-segment depression/elevation;

ST thresh. = threshold value of ST-segment depression/elevation;

QT meas.= measured value of QT interval;

QT norm. = normal value of QT interval calculated using Bazett's formula:

$$QTnorm = k * \sqrt{60 / HR}$$

k is a constant coefficient of .4 for males and .37 for females;

N1 is the number of single ventricular premature beats per min;

N2 is the number of groups of ventricular premature beats per min;

N3 is the number of ventricular fibrillation/flutter episodes per min.

Claim 72 (New) The process as in claim 71, further comprising the step of adjusting constants K_1, K_2 and K_3 depending upon a set of clinical data obtained by predicting said abnormal medical condition, so that as more experiments and trials are performed, said constants may be modified to provide more accurate forecasting.

Claim 73 (New) The process as in claim 72, wherein initial values of said constant K1 is approximately 1.49, K2 is approximately 34.91, and K3 is approximately 73.68.